UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/541,815	07/08/2005	Axel Gerlt	2454.1045	6108

21171 7590 02/16/2011

STAAS & HALSEY LLP
SUITE 700
1201 NEW YORK AVENUE, N.W.
WASHINGTON, DC 20005

EXAMINER	
SUCH, MATTHEW W	

ART UNIT	PAPER NUMBER
2891	

MAIL DATE	DELIVERY MODE
02/16/2011	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/541,815	GERLT ET AL.	
	Examiner	**Art Unit**	
	MATTHEW W. SUCH	2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14 and 23-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 23-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9 September 2010 has been entered.

Claim Objections

2. Claim 27 is objected to because of the following informalities: the phrase "organic resistive" in Line 6 should read "organo-resistive". Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 7, 23 and 25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the

claimed invention. Claim 7 recites "ohmically coupling" the first circuit between and to a ground potential and a supply voltage. Claim 7 recites "ohmically coupling" and claims 23 and 25 each recites "ohmically coupled". Each of these limitations is not supported by the originally filed disclosure and therefore constitutes new matter. In regards to claim 7, the closest support for the "ohmically coupling" steps set forth is found in Fig. 2 of the drawings. However, this drawing is merely a schematic of the circuit and does not set forth that the elements are connected by "ohmically coupling". In regards to claims 23 and 25, there is simply no teaching anywhere in the specification that the electrolyte is "ohmically coupled" to anything. In fact, none of the words "ohmically", "coupled" and "coupling" even appear anywhere in the entire disclosure.

5. Claims 23 and 25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The claim recites "an organo-resistive material ohmically coupled to the electrolyte", which is not enabled by the specification. In fact, the specification teaches that the electrolyte is <u>not ohmically coupled</u> to the organo-resistive material since this device does not follow Ohm's law (V=IR). See, for example, Ruzyllo (Semiconductor Glossary, entry for "ohmic contact"; supplied with Office action dated 10 June 2009) which teaches that an ohmic coupling has resistance that is independent of applied voltage (as set forth in Ohm's law). Rather, the specification clearly teaches that "the resistance (and with it the conductivity) is in this case

altered by several orders of magnitude" (Page 2, Lines 19-20) and more specifically teaches "applying an electrical voltage between 2 and 3 initiates an ionic current through 4, whereby organo-resistive material 2 is either oxidized or reduced and is thus rendered conductive or non-conductive" (Page 5, Lines 8-11). The specification specifically teaches that the organo-resistive material is not ohmically coupled to the electrolyte but rather the resistance (conductivity) changes as a result of the voltage applied. This non-ohmic behavior is the critical feature of the disclosed device. As such, the recitation of "an organo-resistive material ohmically coupled to the electrolyte" is not enabled by the disclosure.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 23 and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims each recite "an organo-resistive material ohmically coupled to the electrolyte". However, the specification teaches that the electrolyte is not ohmically coupled to the organo-resistive material since this device does not follow Ohm's law (V=IR). Rather, the specification clearly teaches that "the resistance (and with it the conductivity) is in this case altered by several orders of magnitude" (Page 2, Lines 19-20) and more specifically teaches "applying an electrical voltage between 2 and 3 initiates an ionic current through 4, whereby

organo-resistive material 2 is either oxidized or reduced and is thus rendered conductive or non-conductive" (Page 5, Lines 8-11). The specification specifically teaches that the organo-resistive material is not ohmically coupled to the electrolyte but rather the resistance (conductivity) changes as a result of the voltage applied. As such, the recitation of "an organo-resistive material ohmically coupled to the electrolyte" renders the claim indefinite because it is unclear how the organo-resistive material can be ohmically coupled to the electrolyte.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claim interpretations: The Examiner notes that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See, e.g., In re Pearson, 181 USPQ 641 (CCPA); In re Minks, 169 USPQ 120 (Bd Appeals); In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). See MPEP §2114. The recitation of "memory unit having a storage function" does not distinguish the present

invention over the prior art, each of which teach the structure as claimed (full explanation to follow). Nevertheless, the devices of the prior art are memory devices with storage function as described below.

The examiner notes that a claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. Ex parte Masham, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) See MPEP § 2114. Furthermore, while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). See MPEP § 2112.01. The recitations of "wherein the storage function of the unit results from the organo-resistive material being embedded in the electrolyte" (in claims 1 and 13), "so that the flow of ionic current through the electrolyte due to application of a voltage to the conductive material causes a readable change in at least one of the conductance or color of the organo-resistive material" (in claim 2), "wherein a voltage applied to the conductor causes a readable change in the color of the organo-resistive material in response to the flow of ionic current through the electrolyte upon said application of the voltage" (in claim 25), "memory" (in claim 27), and "wherein an electrical potential applied between the organic resistive material and the conductor causes the organo-resistive material to conduct or not conduct, and wherein the storage function of the memory unit results from the organo-resistive material being embedded in the electrolyte" (in claim 27) are intended use language which do not differentiate the claimed device from the prior art, who teaches the structure of the claims as described below.

a. Claims 1-4, 6-7, 9, 12-13 and 25-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Roth (Languir, Vol. 18; supplied to Applicant with Office action dated 19 September 2008).

The claims merely describe a notoriously well-known voltammetry device and is disclosed by Roth, who teaches a memory unit having a storage function composed substantially of organic material comprising: an electrolyte ("Electrolyte A" or "Electrolyte B" as described "Chemicals and Materials on Page 4031) and an organo-resistive material ($C_{12}Fc$, PM1, PM3 as described throughout the article) embedded in the electrolyte (see Page 4032, specifically Left Col., Lines 7-9 and Right Col., Lines 3-5 and Figure 1 describing that $C_{12}Fc$, PM1, PM3 are applied on a working electrode and then immersed in electrolyte, which is embedding the organo-resistive material into the electrolyte) to form the memory unit. The organo-resistive material of PM1 and PM3 have conjugated chains (see Figure 2, for example). The organo-resistive material is disposed in structured form (as a SAM - self assembled monolayer, see Page 4031-4032) on a substrate (a glass slide, see Page 4032). The organic-resistive material is also soluble for processing (see "Gold Ball Electrode" section on page 4032 which explains that $C_{12}Fc$, PM1, PM3 are soluble). The memory unit further includes a conductive electrode material (counter electrode, see Page 4032 and Figure 1) which is separated from the organo-resistive material by the electrolyte. The memory action includes the organo-resistive material in either a conducting state or a non-conductive state, by either oxidation or reduction of the organo-resistive material and charge storage retention (see

Figures 2 and 7 and associated text showing various oxidation states and conduction properties shown therewith).

Regarding claim 7, Roth teaches a method of making the memory unit ohmically coupled "a first circuit" between a ground and supply voltage (see Figure 2 and associated text, for example) and also include the aforementioned organo-resistive material and electrolyte, as well as a resistor (see R1, for example, in Figure 2).

Regarding claim 27, the usage of the word "memory" does not distinguish the claims from the prior art because the claim establishes that the memory has an electrolyte, an organo-resistive material embedded in the electrolyte, and a conductor embedded in the electrolyte. Since these elements are taught by Roth as shown above, the memory is present.

See treatments of functional language above under "claim interpretations".

b. Claims 1-4, 6-7, 9, 12-13 and 25-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Roth (J. Vac. Sci. Technol. B, Vol. 18; supplied to Applicant with Office action dated 19 September 2008).

The claims merely describe a notoriously well-known voltammetry device and is disclosed by Roth, who teaches a memory unit having a storage function composed substantially of organic material comprising: an electrolyte (distilled CH_2Cl_2 containing 0.1 M Bu_4NPF_6 in II. Experiment and Figure 2 caption) and an organo-resistive material (PM0, PM1, PM2, PM3 as describe in Figure 1, for example) embedded in the electrolyte (see Page 2360 II. Experiment, Lines 12-16 and Figure 2 caption) to form the memory

unit. The organo-resistive material of PM0, PM1, PM2, a band PM3 have conjugated chains (see Figure 1, for example). The organo-resistive material is disposed in structured form (as a SAM - self assembled monolayer, see II. Experiment) on a substrate (soft glass, II. Experiment). The organic-resistive material is also soluble for processing (see II. Experiment section which explains that the SAM is processed in solution and is soluble). The memory unit further includes a conductive electrode material (Ag counter electrode, see Figure 2 caption) which is separated from the organo-resistive material by the electrolyte. The memory action includes the organo-resistive material in either a conducting state or a non-conductive state, by either oxidation or reduction of the organo-resistive material and charge storage retention (see Figures 2 and 7 and associated text showing various oxidation states and conduction properties shown therewith).

Regarding claim 7, Roth teaches a method of making the memory unit ohmically coupled (since they are in electrical contact, as noted by Applicant – see Remarks Page 6) to a first circuit between a ground and supply voltage (see Figure 2 and associated text, for example) and also including the aforementioned organo-resistive material and electrolyte, as well as a resistor (see R1, for example, in Figure 2).

Regarding claim 27, the usage of the word "memory" does not distinguish the claims from the prior art because the claim establishes that the memory has an electrolyte, an organo-resistive material embedded in the electrolyte, and a conductor embedded in the electrolyte. Since these elements are taught by Roth as shown above, the memory is present.

See treatments of functional language above under "claim interpretations".

c. Claims 1-6, 9-14 and 25-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Sakurai (`879).

The claims merely describe a notoriously well-known organic electrochemical device and is disclosed by Sakurai, who teaches a memory unit having a storage function composed substantially of organic material comprising: an electrolyte (Element 3, Figs. 5-6; Col. 17, Lines 43-44 and Col. 18, Lines 44-45) and an organo-resistive material of polypyrrole, for example (Elements 13 or 14, Figs. 5-6; Col. 17, Lines 53-55 and Col. 18, Lines 46-49) embedded in the electrolyte (see Figs. 5-6), to form the memory unit. The electrolyte is aqueous (Col. 17, Lines 43-44 and Col. 18, Lines 44-45). The organo-resistive material of polypyrrole has conjugated chains. The organo-resistive material is disposed in structured form (see Elements 13 or 14, for example) on a substrate of Nesa glass (Element 1; Col. 17, Lines 39-40 and Col. 18, Line 42). The organic-resistive material of polypyrrole is also soluble for processing (material is dissolved during dendrite formation processes). The memory unit further includes a conductive electrode material (Element 4) which is separated from the organo-resistive material by the electrolyte (Figs. 5-6).

Regarding the indefinite recitation of "ohmically coupled" claim 25, Sakurai must meet this recitation since the structure of the organo-resistive material is embedded in the electrolyte as claimed.

Regarding claim 27, the usage of the word "memory" does not distinguish the claims from the prior art because the claim establishes that the memory has an

electrolyte, an organo-resistive material embedded in the electrolyte, and a conductor embedded in the electrolyte. Since these elements are taught by Sakurai as shown above, the memory is present.

See treatments of functional language above under "claim interpretations".

d. Claims 1-14 and 23-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Misra (`270).

The claims merely describe a notoriously well-known redox device and is disclosed by Misra, who teaches a memory unit having a storage function composed substantially of organic material comprising: an electrolyte (Element 170; Col. 7, Lines 35-57) and an organo-resistive material (Element 120 is PANI, same material disclosed by Applicant, see Col. 4, Lines 35-38) embedded in the electrolyte (see Figs 4A and 4B shows Element 120 embedded in Element 170), to form the memory unit. The electrolyte can be water-based or solid (Col. 7, Lines 53-56). The organo-resistive material of PANI has conjugated chains. The organo-resistive material is disposed in structured form on a substrate (Element 300, for example). The organic-resistive material of PANI is soluble. The memory unit further includes a conductive electrode material (Element 110) which is separated from the organo-resistive material by the electrolyte (see Figs. 4A and 4B).

Regarding claim 7, Misra teaches a method of making the memory unit ohmically coupled to a first circuit between a ground and supply voltage (see Col. 7, Lines 63-66, for example) and also include the aforementioned organo-resistive material and electrolyte, as well as a resistor, which is another memory device in an array (Fig. 1 and

Col. 5, Lines 8-11, for example). Each memory in the array has a given storage density value, and by forming an array, further storage density value higher than the given value results since there are more than one memory units. Further, since each memory unit in the array contains another organo-resistive component, the other memory unit is the electronic organic component of claim 23 which has the same organic material as the original organo-resistive material (Col. 5, Lines 8-11, for example).

Regarding the indefinite recitation of "ohmically coupled" claims 23 and 25, Misra must meet this recitation since the structure of the organo-resistive material is embedded in the electrolyte as claimed.

Regarding claim 27, the usage of the word "memory" does not distinguish the claims from the prior art because the claim establishes that the memory has an electrolyte, an organo-resistive material embedded in the electrolyte, and a conductor embedded in the electrolyte. Since these elements are taught by Misra as shown above, the memory is present.

See treatments of functional language above under "claim interpretations".

e. Claims 1-14 and 23-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Wrighton (`673).

The claims merely describe a notoriously well-known redox device and is disclosed by Wrighton, who teaches a memory unit having a storage function composed substantially of organic material comprising: an electrolyte (Element 18; Col. 11, Line 35) and an organo-resistive material (Element 16; Col. 11, Line 34) embedded in the

electrolyte (see Fig. 12, at least), to form the memory unit. The electrolyte is water-based (Col. 9, Lines 34, at least). The organo-resistive material of poly-3methylthiophene has conjugated chains (Col. 2, Line 33, at least). The organo-resistive material is disposed in structured form on a substrate (such as the grid of microelectrodes, see Element 12). The organic-resistive material of poly-3-methylthiophene is soluble (Col. 4, Lines 10-15). The memory unit further includes a conductive electrode material (electrodes other of Element 12 or counter electrode, see Col. 5, Lines 20-21 or Col. 11, Line 35, at least) which is separated from the organo-resistive material by the electrolyte. The memory functionality includes changes in conductivity of the organo-resistive material (Col. 6, Lines 39-51) or changes in color of the organo-resistive material (Col. 11, Lines 29-38).

Regarding claim 7, Wrighton teaches a method of making the memory unit ohmically coupled to a first circuit between a ground and supply voltage (see Col. 8, Lines 8-65, for example, which describe methods of operating the device by applying a voltage potential across the device) and also include the aforementioned organo-resistive material and electrolyte, as well as a resistor, which is another memory device in an array (Fig. 12, for example). Each memory in the array has a given storage density value, and by forming an array, further storage density value higher than the given value results since there are more than one memory units. Further, since each memory unit in the array contains another organo-resistive component, the other memory unit is the electronic organic component of claim 23 which has the same organic material as the original organo-resistive material (see the array formed, for example, in Fig. 12).

Regarding the indefinite recitation of "ohmically coupled" claims 23 and 25, Misra must meet this recitation since the structure of the organo-resistive material is embedded in the electrolyte as claimed.

Regarding claim 27, the usage of the word "memory" does not distinguish the claims from the prior art because the claim establishes that the memory has an electrolyte, an organo-resistive material embedded in the electrolyte, and a conductor embedded in the electrolyte. Since these elements are taught by Wrighton as shown above, the memory is present.

See treatments of functional language above under "claim interpretations".

f. Claims 1-4, 6-14 and 23-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Wrighton (`601).

The claims merely describe a notoriously well-known redox device, such as a cyclic voltammetric device, and is disclosed by Wrighton, who teaches a memory unit having a storage function composed substantially of organic material comprising: an electrolyte, such as CH_3CN/0.1M [n-Bu_4]-ClO_4 (Col. 12, Lines 39-40, at least) and an organo-resistive material, such as polypyrrole (see Electrode number 4 or 5 in Fig. 7, for example; Col. 12, Lines 39-40) embedded in the electrolyte (see Fig. 7 and associated text, at least), to form the memory unit. The electrolyte is water based (see Col. 9, Lines 10-12). The organo-resistive material of polypyrrole has conjugated chains (Col. 12, Lines 39-40, at least). The organo-resistive material is disposed in structured form on a substrate (such as Si/SiO_2 see Fig. 7). The organic-resistive material of polypyrrole is

soluble (Col. 9, Lines 37-41, for example). The memory unit further includes a conductive electrode material (counter electrode, such as SCE; see Col. 9, Lines 23-25 and Col. 12, Lines 67-68, at least, or uncoated Au electrodes shown in Fig. 7) which is separated from the organo-resistive material by the electrolyte. The memory functionality includes changes in conductivity of the organo-resistive material (see hysteresis in Fig. 7; Col. 12, Lines 47-52; Col. 4, Lines 58-61; Col. 5, Lines 54-68) or changes in color of the organo-resistive material (Col. 6, Lines 24-26).

Regarding claim 7, Wrighton teaches a method of making the memory unit ohmically coupled to a first circuit between a ground and supply voltage (see Col. 9, Lines 15-34, for example, which describe methods of operating the device by applying a voltage potential across the device) and also include the aforementioned organo-resistive material and electrolyte, as well as a resistor, which is another memory device in an array (Fig. 7, for example). Each memory in the array has a given storage density value, and by forming an array, further storage density value higher than the given value results since there are more than one memory units. Further, since each memory unit in the array contains another organo-resistive component, the other memory unit is the electronic organic component of claim 23 which has the same organic material as the original organo-resistive material (see the array formed, for example, in Fig. 7).

Regarding the indefinite recitation of "ohmically coupled" claims 23 and 25, Misra must meet this recitation since the structure of the organo-resistive material is embedded in the electrolyte as claimed.

Regarding claim 27, the usage of the word "memory" does not distinguish the claims from the prior art because the claim establishes that the memory has an electrolyte, an organo-resistive material embedded in the electrolyte, and a conductor embedded in the electrolyte. Since these elements are taught by Wrighton as shown above, the memory is present.

See treatments of functional language above under "claim interpretations".

g. Claims 1-4, 6-14 and 23-27 are rejected under 35 U.S.C. 102(b) as being anticipated by Marrocco, III (`257).

The claims merely describe a notoriously well-known redox-active device, such as a resistive memory cell, and is disclosed by Marrocco, III, who teaches a memory unit (Col. 4, Lines 44-47) having a storage function composed substantially of organic material comprising: an electrolyte (Element 7, 28; Col. 7, Line 40; Col. 10, Lines 59-60, at least) and an organo-resistive material (Element 3, 5, 26, 27; Col. 7, Lines 37-39; Col. 8, Lines 62-68; Col. 10, Lines 57 and 61; Col. 10, Lines 65-68; Col. 11, Lines 1-18, at least) embedded in the electrolyte (see Figs. 1 and 4, at least), to form the memory unit. The electrolyte is a solid (see, for example, polyvinylpyridinium chloride at Col. 10, Lines 63-64, at least). The organo-resistive material has conjugated chains (Col. 11, Lines 5-10, at least). The organo-resistive material is disposed in structured form on a substrate (Element 21, for example). The organic-resistive material of is soluble (Col. 10, Lines 19-21, for example). The memory unit further includes a conductive electrode material (other of Elements 5 and 27, for example) which is separated from the organo-

resistive material by the electrolyte (see Figs. 1 and 4). The memory functionality includes changes in conductivity of the organo-resistive material (see Col. 10, Lines 65-68, for example).

Regarding claim 7, Marracco, III teaches a method of making the memory unit ohmically coupled to a first circuit between a ground and supply voltage (see driver circuits set forth in Fig. 9, for example, and associated text, specifically "R", "C", and "W" voltage potentials) and also include the aforementioned organo-resistive material and electrolyte, as well as a resistor, which is another memory device in an array (Fig. 9, for example). Each memory in the array has a given storage density value, and by forming an array, further storage density value higher than the given value results since there are more than one memory units. Further, since each memory unit in the array contains another organo-resistive component, the other memory unit is the electronic organic component of claim 23 which has the same organic material as the original organo-resistive material (see the array formed, for example, in Fig. 9).

Regarding the indefinite recitation of "ohmically coupled" claims 23 and 25, Misra must meet this recitation since the structure of the organo-resistive material is embedded in the electrolyte as claimed.

Regarding claim 27, the usage of the word "memory" does not distinguish the claims from the prior art because the claim establishes that the memory has an electrolyte, an organo-resistive material embedded in the electrolyte, and a conductor embedded in the electrolyte. Since these elements are taught by Marrocco, III as shown above, the memory is present.

See treatments of functional language above under "claim interpretations".

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 5, 10-11, 14 and 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roth (J. Vac. Sci. Technol. B, Vol. 18; supplied to Applicant with Office action dated 19 September 2008).

Regarding claims 5, 10-11 and 14, Roth teaches the memory unit of claims 1, 3 and 4 wherein the organic-resistive material is also soluble for processing (see II. Experiment section which explains that the SAM is processed in solution and is soluble). However, the device uses a solvent electrolyte of CH_2Cl_2 (see II. Experiment). However, Roth also suggests building a device with a solid electrolyte (IV. Outlook, Right Col., Lines 25-27). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use a solid electrolyte since Roth suggests building such a device to explore the properties thereof (IV. Outlook, Right Col., Lines 25-27).

Regarding claims 23 and 24, Roth does not explicitly teach using many of the memory units in an array, but suggests that a miniaturized the memory unit would be useful in high density arrays of memory (Page 2359, Right Col. and IV Outlook point (1) on Page 2363, Left

Col.). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the disclosed memory cells of Roth in an array of duplicate cells to produce the high density memory array as suggest by Roth (Page 2359, Right Col. and IV Outlook point (1) on Page 2363, Left Col.). It has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). See MPEP § 2144.04 VI-B. Additionally, since each memory unit includes the aforementioned organo-resistive material and electrolyte, the resistor is merely another memory device in an array. Each memory in the array has a given storage density value, and by forming an array, further storage density value higher than the given value results since there are more than one memory units. Further, since each memory unit in the array contains another organo-resistive component, the other memory unit is the electronic organic component of claim 23 which has the same organic material as the original organo-resistive material.

12. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Roth (J. Vac. Sci. Technol. B, Vol. 18; supplied to Applicant with Office action dated 19 September 2008) in view of Beckman (`536).

Roth teaches that the memory unit is measured by voltammetry with a voltage drop, but does not teach the conventional details of the circuit, except for the voltage drop between the working and counter electrodes (III. Results and Discussion).

However, Beckman teaches a conventional electrochemical cell (Element 1) ohmically coupled to a first circuit (See Figs. 1 and 2) with the working electrode (Element 2) and counter

electrode (Element 4) "ohmically coupled" between ground (on side of Element 4) and a voltage supply (on side of Element 2). It would have been obvious to one of ordinary skill in the art at the time the invention was made to place the memory unit between a supply voltage and a ground potential in order to establish the required voltage potential across the working and counter electrodes.

Roth does not explicitly teach using many of the memory units in an array, but suggests that a miniaturized the memory unit would be useful in high density arrays of memory (Page 2359, Right Col. and IV Outlook point (1) on Page 2363, Left Col.). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the disclosed memory cells of Roth in an array of duplicate cells to produce the high density memory array as suggest by Roth (Page 2359, Right Col. and IV Outlook point (1) on Page 2363, Left Col.). It has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. In re Harza, 274 F.2d 669, 124 USPQ 378 (CCPA 1960). See MPEP § 2144.04 VI-B. Additionally, since each memory unit includes the aforementioned organo-resistive material and electrolyte, the resistor is merely another memory device in an array. Each memory in the array has a given storage density value, and by forming an array, further storage density value higher than the given value results since there are more than one memory units. Further, since each memory unit in the array contains another organo-resistive component, the other memory unit is the electronic organic component of claim 23 which has the same organic material as the original organo-resistive material.

Response to Arguments

13. Applicant's arguments filed 19 March 2009 have been fully considered but they are not persuasive.

14. Applicant traverses the rejection of claims 23 and 25 under 35 U.S.C. 112, first paragraph for enablement. The Applicant asserts that the examiners position ignores the word "coupling" in the treatment of the claims and treatment of the arguments (see Remarks Pages 5-10). This is not correct. In response, the examiner notes that the word coupling is not ignored, but rather is insignificant to the issue at hand and does not distinguish the phrase "ohmically coupled" from the prior art, nor enables the device. The Applicant's entire position about "ohmically coupled" somehow not being related to "ohmic contact" is based on that "coupling" is taken to be broader than "contact". This position is completely untenable for a variety of reasons. Firstly, the Applicant continues to assert that ohmic contact must require physical contact. This is simply false. The word "contact" is not limited to physical contact, and can include a variety types of contact. In this case, electrical contact. Furthermore, the Applicant's examples that coupling can include capacitive or inductive coupling is not relevant to the issue since neither capacitive or inductive coupling are ohmic in any way. Additionally, the Applicant's invention does not have anything to do with capacitive or inductive coupling of the organo-resistive material with the electrolyte and so these arguments are irrelevant to the issue. However, this entire line of argument and the Applicant's entire line of reasoning is totally irrelevant to the fact that the Applicant's specification simply does not provide any enablement whatsoever for the electrolyte and organo-resistive material to be "ohmically coupled". In fact, this position is an argument against the Applicant's own invention, as described by the Applicant's own words in the

disclosure. Indeed, the entirety of the Applicant's disclosure is directed to a device that does not have ohmic coupling since the Applicant has set forth that placing the organo-resistive material in the electrolyte results in non-ohmic behaviors. See the statements of "the resistance (and with it the conductivity) is in this case altered by several orders of magnitude" (Page 2, Lines 19-20) and more specifically "applying an electrical voltage between 2 and 3 initiates an ionic current through 4, whereby organo-resistive material 2 is either oxidized or reduced and is thus rendered conductive or non-conductive" (Page 5, Lines 8-11). Further confounding the Applicant's position is that they do not provide any evidence whatsoever that the organo-resistive material is ohmically coupled to the electrolyte. The Applicant does not point out anything from the disclosure or presents any other evidence. In fact, the entire disclosure is totally devoid of any evidence of ohmically coupled or ohmic coupling and usage of the these terms in the claim constitute new matter (see rejections of claims 7, 23 and 25 above as rejection under 35 U.S.C. 112, first paragraph, for new matter). The Applicant then argues that the term "ohmically coupled" means connected electrically directly. However, this position is not persuasive since the Applicant provides absolutely no evidence that this is the meaning of the term "ohmically coupled" that was intended. The entire disclosure is totally devoid of the words "ohmically coupled" and, as such, the Applicant is unable to provide any support for their position. As such, the rejections of claims 23 and 25 under 35 U.S.C. 112, first paragraph for lack of enablement and 35 U.S.C. 112, second paragraph as being indefinite are proper and maintained.

15. Regarding Applicant's traversal of the rejection of claims 1-4, 6-7, 9, 12-13 and 25-26 under 35 U.S.C. 102(b) as anticipated by Roth (Languir, Vol. 18; supplied to Applicant with Office action dated 19 September 2008) and rejections under 103(a) citing Roth:

The Applicant argues that Roth does not teach "organo-resistive material embedded in the electrolyte to form the memory unit". Applicant argues that Roth teaches a self-assembled monolayer formed on the surface of an electrode which is exposed in the electrolyte. This is not persuasive for the following reasons. As the Office action points out the self-assembled monolayer (SAM) is the organo-resistive material. The self-assembled monolayer (which is the organo-resistive material) is on an electrode 2000 Angstroms high, with a PDMS well enclosing the SAM covered electrode and embedded in the electrolyte (see Section Band Electrodes on Page 4032, for example or Lines 1-9 of Right Col., on Page 4032). The relevant portions of the reference reads "All potentials are versus Ag/Ag+ and recorded in dried, distilled CH_2Cl_2 containing 0.1 M Bu_4NPF_6" (see last three lines of Page 2360, Left Col.) and "the PM0 SAM on a 25 μm diam Au electro in a thin film of an electrolyte solution containing 0.10 M Bu_4NPF_6 in dried, distilled CH_2Cl_2" (see caption of Figure 2). Applicant's citation of the passage of Page 4032, Left Col., Lines 3-7 is not relevant to the rejection as set forth because this passage is about forming the self-assembled monolayer (which is the organo-resistive material) on an electrode. The Applicant's argument that Roth does not expose the organo-resistive material and that "since Roth-Langmuir places an electrode in a solution including an organo-resistive material to form a self-assembled monolayer on the surface of the electrode, and then exposes the electrode to an electrolyte solution", Roth has no "organo-resistive material embedded in the electrolyte to form the memory unit". This is incorrect. The self-assembled monolayer, which is

the organo-resistive material is immersed in the electrolyte (see "the PM0 SAM on a 25 μm diam Au electro in a thin film of an electrolyte solution containing 0.10 M Bu_4NPF_6 in dried, distilled CH_2Cl_2" see caption of Figure 2). As already noted, the self-assembled monolayer (SAM) is the organo-resistive material and since the electrode has the SAM thereon when exposed to the electrolyte. Therefore, Roth clearly teaches the claimed invention.

16. Regarding Applicant's traversal of the rejection of claims 1-4, 6-7, 9, 12-13 and 25-26 under 35 U.S.C. 102(b) as anticipated by Roth (J. Vac. Sci. Technol. B, Vol. 18; supplied to Applicant with Office action dated 19 September 2008) and rejections under 103(a) citing Roth and Beckmann (`536):

The Applicant argues that Roth does not teach "an organo-resistive material embedded in the electrolyte to form the memory unit". Applicant points to Page 2360, Left Col., Lines 7-11 of Section II, Experiment for support. This is not persuasive for the following reasons. The examiner notes that the Applicant's citation of Page 2360, Left Col., Lines 7-11 of Section II, Experiment is not relevant to the rejection. As the Office action points out the organo-resistive material is indeed embedded in the electrolyte. The relevant portions of the reference reads "All potentials are versus Ag/Ag+ and recorded in dried, distilled CH_2Cl_2 containing 0.1 M Bu_4NPF_6" (see last three lines of Page 2360, Left Col.) and "the PM0 SAM on a 25 μm diam Au electro in a thin film of an electrolyte solution containing 0.10 M Bu_4NPF_6 in dried, distilled CH_2Cl_2" (see caption of Figure 2). Applicant's citation of this very passage (see Remarks Page 10, Lines 3-5) confirms that Roth meets the claim by teaching the organo-resistive material embedded in the electrolyte. In addition, Applicant's argument regarding the microelectrode being removed and

citation of Page 2360, Left Col., Lines 11-12 of Section II, Experiment is also irrelevant to the rejection because it is about forming the organo-resistive material on an electrode. Also, the Applicant is completely misreading the reference and, as a result, the Applicant's arguments are not commensurate with the scope of the rejection set forth. The Applicant contends that the porphyrin of Roth is the electrolyte (see Remarks Page 12, Lines 15-28). This is not only an incorrect reading of the prior art of Roth, but has nothing to do with the rejection set forth. As noted in the Office action above, the porphyrin is the organo-resistive material.

17. Regarding Applicant's traversal of the rejection of claims 1-6, 9-14 and 25-26 under 35 U.S.C. 102(e) as anticipated by Sakurai (`879):

The Applicant argues that Sakurai does not teach an organo-resistive material embedded in the electrolyte to form the memory unit and cites Col. 17, Lines 38-43. The Applicant further argues that Sakurai teaches that the device is used as a solar cell and not used as a memory unit. This is not persuasive. The Applicant's position relies upon a different use for the claimed device than the prior art intends to use the device for. In response the Examiner notes that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. See, e.g., In re Pearson, 181 USPQ 641 (CCPA); In re Minks, 169 USPQ 120 (Bd Appeals); In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). See MPEP § 2114. As pointed out by the Office action, the prior art of Sakurai teaches all of the limitations of the claim and therefore teaches a structure that is identical to the claimed invention. Where the claimed and prior art products are identical or

substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). See MPEP § 2112.01. The manner of operating the device does not differentiate the apparatus claim from the prior art. See MPEP § 2114. The Applicant's argument that the claimed invention has a different structure because Sakuri teaches a solar cell and that a solar cell is submitted to be a structural difference is not convincing. The Applicant fails to point out how the device of Sakuri is structurally different from the claims.

The Applicant also argues that "in Sakurai, moreover, an aluminum electrode 4 is formed on the Mg phthalocyanine coating layer via an aqueous electrolyte solution, instead of 'an organo-resistive material embedded in the electrolyte to form the memory unit,' as recited in claim 1" (see Remarks Page 14, Lines 2-4). This is not persuasive. This argument is not commensurate with the rejection set forth and is therefore not relevant to the issues at hand. Instead, the Office action cites to Element 4 of Sakurai as a conductive electrode material which is separated from the organo-resistive material by the electrolyte. The examiner never refers to Element 4 as the organo-resistive material embedded in the electrolyte.

The Applicant also argues that the dendritic structure (Element 13) is not an organo-resistive material and cites Col. 17, Lines 43-47 for support of this argument. However, this citation actually states that the polypyrrole has dendritic structures. In other words, the dendrites are polypyrrole (see also Col. 17, Lines 53-55 which reads "when a section of the resultant polypyrrole film 2 was observed with a TEM dendritic structures 13 of a few μm high were found"), which is the organo-resistive material (the examiner notes that the Applicant's own

specification teaches that polypyrrole is an organo-resistive material - see Page 3, Line 19). As such, the Applicant's arguments are in direct contradiction to the teachings of the Applicant's own specification and are not convincing.

The Applicant also argues that the pyramidal projections (Element 14) is not an organo-resistive material and cites Col. 18, Lines 45-49 for support of this argument. However, this citation actually states that the polypyrrole has pyramidal projections. In other words, the pyramidal projections are polypyrrole, which is the organo-resistive material (the examiner notes that the Applicant's own specification teaches that polypyrrole is an organo-resistive material - see Page 3, Line 19). As such, the Applicant's arguments are in direct contradiction to the teachings of the Applicant's own specification and are not convincing.

18. Regarding Applicant's traversal of the rejection of claims 1-14 and 23-26 under 35 U.S.C. 102(e) as anticipated by Misra (`270):

The Applicant argues that Misra does not teach an organo-resistive material embedded in the electrolyte to form the memory unit and argues that Misra teaches that the device is used as a crossbar array and not used as a memory unit. This is not persuasive. The Applicant's position relies upon a different use for the claimed device than the prior art intends to use the device for. In response the Examiner notes that a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. See, e.g., In re Pearson, 181 USPQ 641 (CCPA); In re Minks, 169 USPQ 120 (Bd Appeals); In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963). See MPEP § 2114. As pointed

out by the Office action, the prior art of Misra teaches all of the limitations of the claim and therefore teaches a structure that is identical to the claimed invention. Where the claimed and prior art products are identical or substantially identical in structure or composition, or are produced by identical or substantially identical processes, a prima facie case of either anticipation or obviousness has been established. In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977). See MPEP § 2112.01. The manner of operating the device does not differentiate the apparatus claim from the prior art. See MPEP § 2114.

The Applicant also argues that Misra mentions no organo-resistive material and cites Col. 4, Lines 36-38 arguing that PANI is not an organo-resistive material. However, the examiner notes that this citation, including the PANI material, actually supports that Misra teaches the organo-resistive material because the Applicant's own specification teaches that PANI is an organo-resistive material (see Specification Page 3, Line 18). The Applicant argues that Misra does not teach an organo-resistive material and attempts to use the teachings of Misra as evidence to support their position. Specifically the Applicant cites Col. 4, Lines 36-38 as evidence that the material of PANI cited by Misra cannot be an organo-resistive material of the claims since Misra refers to the material as intrinsically conducting. This is not persuasive. In fact, this position and evidence cited by the Applicant directly and explicitly contradicts the Applicant's own specification. Specifically, the Applicant explicitly teaches that PANI is an organo-resistive material in the invention (see Page 2, Line 12 as well as Page 3, Lines 12 and 18). Furthermore, the Applicant's specification teaches that "all intrinsically conductive… organic materials can be used" (see Page 3, Lines 16-17). The Applicant's argument amounts to an attempt to disown their own specification and material of PANI (which, as shown herein, is

taught by the Applicant as an organo-resistive material). This position is untenable. The Applicant cannot simply ignore the teachings of their own specification in attempting to distinguish the claims from the prior art. As such, the Applicant's arguments are in direct contradiction to the teachings of the Applicant's own specification and are not convincing.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Swager (`309) teaches redox active cells with memory effects using organic materials and electrolytes (see results in Figs. 7-12, for example).

Contact Information

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW W. SUCH whose telephone number is (571)272-8895. The examiner can normally be reached on Monday - Friday 9AM-5PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kiesha Bryant can be reached on (571) 272-1844. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew W. Such/
Primary Examiner, Art Unit 2891